



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/772,858	01/31/2001	Akifumi Kamijima	033211-002	2102

7590

03/10/2004

E. Marcie Emas
BURNS, DOANE, SWECKER & MATHIS, L.L.P.
P.O. Box 1404
Alexandria, VA 22313-1404

EXAMINER

OLSEN, ALLAN W

ART UNIT	PAPER NUMBER
----------	--------------

1763

DATE MAILED: 03/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

AS

Office Action Summary	Application No.	Applicant(s)	
	09/772,858	KAMIJIMA, AKIFUMI	
	Examiner	Art Unit	
	Allan Olsen	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 1, 8 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by US Patent 5,316, 617 issued to Kawabe et al. (hereinafter, Kawabe).

Kawabe teaches using an ion beam to pattern a layer of PERMALLOY (28) and to pattern an underlying layer of alumina (26). Kawabe teaches that layer 28 is then removed. See figures 9C-9E and column 9, lines 23-45.

Claims 1, 8 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by US Patent 4,592,8017 issued to Hara et al. (hereinafter, Hara).

Hara teaches using an ion beam to pattern a layer of alumina (27) and to pattern an underlying layer of PERMALLOY (23). Hara teaches that layer 27 can then be is then removed with phosphoric acid. See figures column 5, lines 46-66.

Art Unit: 1763

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 8-10, 17-19, 26 and 27 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US Patent 5,506,197 issued to Nakamura et al. (hereinafter, Nakamura).

Nakamura teaches depositing a strippable SiO₂ film (15) upon a Au layer (14) (figure 3D). Nakamura teaches selectively etching the SiO₂ layer, the Au layer and an underlying oxide superconductor (figure 3E and column 6, lines 34-38). It is noted that in column 6, Nakamura does not mention the type of etching that is used selectively etch the center portion as depicted by figures 3D and 3E. However, with the exception of process steps that relate to the lift-off method of patterning, in every one of Nakamura's references to etching, Nakamura teachings using ion beam etching techniques. Therefore, if one skilled in the art did not understand Nakamura to teach etching the use of an ion beam to etch the SiO₂ layer, it would have been obvious because Nakamura consistently teaches that ion beam etching may be used to pattern the layers. In a subsequent step, Nakamura teaches removing the SiO₂ layer (column 11, line 25). However, before removing the patterned SiO₂, Nakamura teaches depositing an oxide layer (10) and a superconducting channel (20) over the SiO₂ layer (figure 3G).

Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,377,437 issued to Taylor et al. (hereinafter, Taylor).

Taylor teaches forming a mask layer over layer to be patterned by etching. Taylor teaches that a plasma can be used for etching and that the plasma source may be a reactive ion beam. The mask layer of Taylor corresponds to Applicant's claimed strippable film. Taylor teaches a means of forming a protective compound at the surface of the mask layer. Taylor teaches removing unprotected portions of the mask layer by etching with a reactive ion beam and thereby exposing the underlying layer to be etched. Taylor teaches the mask layer may comprise an inorganic or an organic layer. Taylor teaches the mask layer may comprise metallic material. Taylor teaches an organic mask layer may be a conductive organic layer or an insulating organic layer or an insulating organic layer that is treated in a manner that creates a conductive top layer. Taylor teaches grounding the conductive layer. Taylor teaches the process may be used to make magnetic memory devices.

Taylor does not teach removing the strippable film or mask layer.

It would have been obvious to one skilled in the art to remove the mask layer of Taylor because masking layers are typically removed and Taylor teaches no utility of such a layer after fulfilling its function as an etch mask.

Claims 11-16 and 20-25 are rejected under 35 U.S.C. 103(a) as being unpatentable Nakamura as applied to claim 10 above, and further in view of Taylor.

As the material that correspond to Applicant's strippable layer, Nakamura does not teach using: an insulating organic material (claims 11, 20); a conductive organic

Art Unit: 1763

material (claims 12, 21); or an insulating organic material with an overlying, grounded, conductive layer (claims 13-16, 22-25).

For a strippable layer, Taylor teaches using as one of; an organic based silicon oxide, a conductive organic layer, and an insulating organic material with an overlying grounded conductive layer.

It would have been obvious to one skilled in the art to use the strippable layers taught by Taylor in place of the silicon oxide of Nakamura because Taylor teaches that silicon oxide and the other claimed strippable layers are functionally equivalent with some providing the additional benefit of dissipating charge build-up during the ion beam patterning step.

Response to Arguments

Applicant's arguments filed 12/12/2003 have been fully considered but they are not persuasive. Applicant's own description of Kawabe's process indicates that a PERMALLOY film 28 is patterned by ion beam etching and this patterned PERMALLOY film 28 is used as a masking layer during the ion beam etching of underlying alumina layer 26 and PERMALLOY film 24. The PERMALLOY masking layer 28 is removed as a result of the ion beam etching that patterns the underlying layers.

Applicant states:

"Thus, Kawabe et al. merely discloses patterning one film which is then used as a mask to pattern another film. Nothing in Kawabe et al. shows, teaches or suggests etching a strippable film and a thin film using focused ion beam as claimed in claims 1, 8 and 9. Rather, Kawabe et al. merely discloses patterning one film which is then used as a mask to pattern another film."

Art Unit: 1763

The Examiner does not disagree with Applicant's assessment of Kawabe's teachings. However, the Examiner fails to see how these teachings do not read on Applicant's claims. For example, claim 1 includes the following three limitations:

- *"forming at least one strippable film on a surface of a thin film to be patterned";*

this corresponds to Kawabe's formation of PERMALLOY layer 28 on alumina layer 26;

- *"etching said at least one strippable layer and said thin film to be patterned by using focused ion beam etching";*

Kawabe's PERMALLOY 28 and alumina layer 26 are both etched by ion beams;

- *"and removing the etched at least one strippable film";*

Kawabe's PERMALLOY film 28 is removed by the ion beam etching of the underlying layers.

Regarding Hara, the Examiner again agrees with Applicant's description of Hara's method. However, the Examiner believes that the steps of Hara, as described by Applicant, directly read on Applicant's claims. For example, Applicant notes that::

- alumina film 27 is etched by an ion beam;
- then, alumina layer 27 functions as an etch mask while underlying PERMALLOY 23 is ion beam etched;
- and alumina layer 27 may be readily removed.

Art Unit: 1763

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allan Olsen whose telephone number is 571-272-1441. The examiner can normally be reached on M-F 1-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Greg Mills can be reached on 571-272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 1763

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "Allan Olsen". The signature is written in a cursive, flowing style.

Allan Olsen
Primary Examiner
Art Unit 1763